

## ABSTRACT

The present invention provides control methods, control systems, and control software for microfluidic devices that operate by moving discrete micro-droplets through a sequence of determined configurations. Such microfluidic devices are preferably  
5 constructed in a hierarchical and modular fashion which is reflected in the preferred structure of the provided methods and systems. In particular, the methods are structured into low-level device component control functions, middle-level actuator control functions, and high-level micro-droplet control functions. Advantageously, a microfluidic device may thereby be instructed to perform an intended reaction or analysis by invoking micro-droplet  
10 control function that perform intuitive tasks like measuring, mixing, heating, and so forth. The systems are preferably programmable and capable of accommodating microfluidic devices controlled by low voltages and constructed in standardized configurations. Advantageously, a single control system can thereby control numerous different reactions in numerous different microfluidic devices simply by loading different easily understood  
15 micro-droplet programs.

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